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I.—A SYSTEMATIC STUDY OF THE UNITED STATES
AND MEXICAN SPECIES OF PECTIS.

THE genus *Pectis* was founded by Linnæus¹ in 1758, to embrace two West Indian species, *P. ciliaris* and *P. linifolia*; the latter founded upon a plate of Sloane² which is well matched by the West Indian plant with corneous subulate awns. In November, 1759, Linnæus³ gave more complete descriptions of these species, and an additional reference for *P. linifolia*.⁴

In 1762 Jacquin⁵ described his *P. punctata*, which was based upon one of Plumier's figures⁶ in which the leaves are represented as entire and bearing conspicuous marginal glands; while the pappus is described by Plumier⁷ in the words "corona foliacea." (This figure has since been referred by De Candolle⁸ to *P. Swartziana*, Less.). In 1763, in a much fuller account of the plant, Jacquin⁹ describes the pappus as two setæ ("Sem. Hermaphrodita solitaria, linearia, instructa setis duabus"); and the leaves, according to the plate and the description, have cilia at their bases. Linnæus,¹⁰ in the same year, recognized Jacquin's *P. punctata* as distinct from his own *P. linifolia*, though his distinguishing character

¹ Syst. Nat. ed. 10, 1221.

² Hist. Jam. i. t. 149, f. 3 (as *Hieracium*).

³ Amœn. Acad. v. 407.

⁴ *Tagetes* ? 2, Browne, Jam. 319.

⁵ Enum. Pl. Carib. 28.

⁶ Plum. Pl. Amer. ed. Burm. t. 86, f. 1 (as *Knautia*).

⁷ l. c. 74.

⁸ Prodr. v. 99.

⁹ Stirp. Amer. 216, t. 128.

¹⁰ Spec. ed. 2, 1250.

was found only in the punctate leaves of the former. In the same work¹ Linnæus refers to *P. ciliaris* one of Plumier's figures² which is hardly recognizable as the West Indian and Florida species, and, as De Candolle³ suggests, is more likely *P. Carthusianorum*. *P. minuta*, described at the same time by Linnæus,⁴ is an obscure thing unless it is the *P. minuta* of Willdenow's Herbarium, referred by Lessing⁵ to *P. pygmæa*, or the *P. minuta*, Schreb.,⁶ which has been referred to *Bellium minutum*, L. The genus *Seala* was founded by Adanson⁷ in 1763 partly upon Plumier's figure⁸ which Linnæus⁹ had referred to his own *P. ciliaris*.

In 1788 Swartz¹⁰ described *P. humifusa*, a West Indian plant based upon one of Plumier's descriptions and plates;¹¹ and three years later, in 1791, he described a *P. ciliaris*,¹² which is obviously not *P. ciliaris*, L., and which has subsequently been named by Lessing¹³ *P. Swartziana*. In the same work Swartz¹⁴ describes a *P. punctata*, not with the pappus a foliaceous crown as in Plumier's plant (De Candolle refers Plumier's plate to *P. Swartziana*), or merely of two setæ as in Jacquin's second description, but with the pappus of three *subulate* setæ; and this character, as well as the general description of the plant, seems to identify it with *P. linifolia*, L.

During the remainder of the decade three species were published, only one of which proved a good *Pectis*. *P. pinnata*, Lam.¹⁴ (1792) has been identified with *Schkuhria abrotinoides*, as has also *P. multifida*, Orteg.¹⁶ (1797). Cavanille's *P. prostrata*,¹⁶ published in 1797, from Mexico, is a common species.

The first extensive consideration of the genus in this century was by

¹ Spec. ed. 2, 1240.

² Plum. l. c. t. 151, f. 2.

³ l. c. 101.

⁴ Spec. ed. 2, 1250.

⁵ Linnæa, vi. 713 in syn.

⁶ Schreb. in Steud. Nom. ed. 1, 103.

⁷ Fam. ii. 131.

⁸ Plum. Pl. Amer. ed. Burm. t. 151, f. 2.

⁹ Prodr. 114.

¹⁰ *Jacobæa humifusa*, *Hypericifoliis*, Plum. l. c. 84, t. 95, f. 2.

¹¹ Swartz, Obs. 307.

¹² Linnæa, vi. 711.

¹³ l. c. 308.

¹⁴ Jour. Hist. Nat. Par. ii. 150, t. 31.

¹⁵ Hort. Matr. Dec. 45.

¹⁶ Cav. Ic. iv. 12, t. 324.

Poiret,¹ who discussed five of the species already mentioned (omitting *P. minuta* and *P. prostrata*) and described an additional one, *P. fasciculata*² from an unknown habitat. *P. pinnata*, Lam. he retained doubtfully in the genus, and *P. punctata*, Jacq. he kept distinct from *P. linifolia*, L., describing the pappus of the latter as "deux poils roides et piquans," or in the ray-akenes "trois poils très-ouverts," while the pappus of the former he describes as "deux filets sétacés"; yet apparently Poiret had not seen this species and his description was drawn directly from Jacquin.

In 1816 Lagasca founded the genus *Lorentea*,³ distinguished generically from *Pectis* by the character, "pappus paleaceo-setaceus, paleis pluribus, inæqualibus." The original species, *L. prostrata* from Cuba, has subsequently been identified⁴ with *P. humifusa*.

Cassini in 1817 described the genus *Cryptopetalon*⁵ with one species, *C. ciliare* from Peru. The genus was distinguished by the "aigrette . . . composée de squamellules nombreuses, plurisériées, inégales, filiformes, fortement barbellulées, roides comme des crins, rousses, entre-griffées à la base." In the same year he founded the genus *Chthonia*⁶ with one species, *C. glaucescens*. This genus Cassini distinguished from *Pectis* by its paleaceous pappus, while in true *Pectis*, he argued, the pappus is of "squamellules subtriquètres, subulées, cornées, parfaitement lisses. Ainsi, les *pectis punctata* et *linifolia* doivent demeurer dans le genre *Pectis*; mais les *pectis humifusa*, *prostrata*, et probablement le *ciliaris*, doivent entrer dans le genre *Chthonia*."

The collections made by Humboldt and Bonpland during the great scientific expedition headed by Humboldt, contained at least four species of the genus *Pectis* (of which *Chthonia* was made synonymous), and these were described in 1820.⁷ The characterization of the involucre, which had formerly been described as pentaphylous, was extended in the generic description to include forms with 8 or 10 bracts, but the pappus character was limited to aristiform pales ("Akenia linearia, triangulär-compressa, paleis compluribus aristæformibus coronata"⁸). Of the four species described two were from Mexico and two from New Granada;

¹ Dict. v. 119–121.

² Poir. l. c. 120.

³ Lag. Gen. et Sp. Nov. 28.

⁴ Spreng. Syst. iii. 572.

⁵ Bull. Soc. Philom. (1817) 12, & Dict. Sci. Nat. xii. (1818) 123.

⁶ Bull. Soc. Philom. (1817) 33, & Dict. Sci. Nat. ix. (1817) 173, 174.

⁷ HBK. Nov. Gen. & Sp. iv. 261–264.

⁸ HBK. l. c. 261.

but one of the latter, *P. elongata*, with "aristis crebris (20-25), scabris, inæqualibus, patulis, rufescensibus, persistentibus, corollam et akenium aequantibus," has since been found in Mexico. *P. Bonplandiana*, with "aristis 8-10, scabris, basi paulo dilatatis, rufescensibus, corollam aequantibus," is identified with more recent specimens from Southeastern Mexico; and *P. canescens* is a species with variable pappus originally described as having the disk-akenes with "paleis 20-25, aristæformibus, scabriusculis, inæqualibus, rufescensibus, corollam vix superantibus, persistentibus," while the ray-akenes are with "squamulis nonnullis minutis subulatis." The fourth species, *P. pygmæa*, has not yet been found in North America.

In 1823 Cassini¹ discussed *Lorentea*, Lag., stating that it is undoubtedly the same as his own *Chthonia*. But, though Lagasca's genus was published some months before Cassini's, he clings to his own name, arguing, that compared with his own, Lagasca's description is inadequate. *Chthonia repens*,² based perhaps on *Pectis humifusa*, Swartz, and a second species, *C. leptocephala*,³ are described; and after some speculative remarks upon the genus, Cassini says, "Nous présumons que les *Pectis pygmæa* et *Bonplandiana* sont des *Chthonia*, et que les *Pectis elongata* et *canescens* sont des *Cryptopetalon*."

In 1825 Cassini⁴ discussed *Pectis*, restricting it to *P. linifolia*, L., and *P. punctata*, Jacq., and he again emphasized the distinctions he made between the genera: "Les vrais *Pectis* diffèrent essentiellement des *Chthonia* et des *Cryptopetalon*, par l'aigrette, dont les squamellules sont subtrièbres, subulées, cornées, parfaitement lisses; car les squamellules de l'aigrette des *Chthonia* sont paléiforme et dentées inférieurement, filiformes et barbellulées supérieurement; et celles des *Cryptopetalon* sont filiformes et barbellulées d'un bout à l'autre."

Torrey's *P. angustifolia*, described in 1828,⁵ was the first species of *Pectis* recognized without awns, pales, or setæ. The original form with a squamellose crown is not, however, constant, for there are sometimes present one or two slender awns.

In 1830 Lessing⁶ took up the name *Lorentea*, and applied it to a group very different from that of Lagasca. The characters as given by Lessing

¹ Cass. in Dict. Sci. Nat. xxvii. (1823) 202-207.

² Cass. l. c. 204.

³ Cass. l. c. 206.

⁴ l. c. xxxviii. (1825) 202, 203.

⁵ Torr. Ann. Lyc. N. Y. ii. 214.

⁶ Linnæa, v. 135.

were: "Pappus disci 2-serialis, ser. ext. piliformi, brevi, interiori anguste paleacea, serrata, longa; radii nullus aut dimidiatus, coroniformis, brevis." To this genus he transferred *Pectis canescens*, at the same time describing *L. saturejoides* which differs from typical *L. canescens* chiefly in having no ray-pappus. In the same work Lessing instituted the subtribe *Pectideæ*¹ (then placed under *Vernoniaceæ*) to include *Pectis*, *Lorentea*, *Andromachia*, *Liabum*, and *Cucosmia*.

In 1831 Lessing² took up critically the genera of the subtribe *Pectideæ* as he then understood it, i. e. *Pectidium*, *Pectis*, and *Lorentea*. The new genus *Pectidium* had "Pappus aristis, paucis, subulatis, planis, rigidis, corneis, basi incrassatis, lèvissimis, inæqualibus, achænio brevioribus, demum divergentibus"; and the single species *Pectidium punctatum*, founded upon *Pectis punctata*, Jacq., is described as having on the disk-akenes two aristæ, on the ray-akenes three. Note that in the original generic description Linnæus says "Pappus aristatus,"³ and that the characters of *Pectidium* are those ascribed by Cassini to "true *Pectis*," including *P. linifolia*, L., and *P. punctata*, Jacq. The genus *Pectis* (including *Cryptopetalon* and *Chthonia*, Cass., and *Lorentea*, Lag. not Less.) Lessing characterized by "Pappus uniserialis, serratus, aut late paleaceus, paleis 1-nerviis, semilanceolatis, in setam desinentibus, sèpe setigero-laciniatis, aut setaceo-paleaceus." In the genus as thus defined he placed *P. ciliaris*, L., *P. linifolia* [Less. not L.], *P. angustifolia*, *P. elongata*, *P. Bonplandiana*, *P. pygmæa*, and *P. prostrata*; and a number of new species, *P. Swartziana* founded upon *P. ciliaris*, Swartz,⁴ in part, and four others from the West Indies. To the genus *Lorentea* he added *L. humifusa* (*Pectis humifusa*, Swartz), and a new species, *L. sessiliiflora*, which we know only from South America.

In 1832 Torrey's *Pectis angustifolia* was taken up by Rafinesque⁵ under the name *Helioreas*, though this name appears to have been overlooked by the subsequent authors who took up De Candolle's *Pectidopsis*.

In the *Prodromus* De Candolle⁶ accepted, with slight modifications, the views of Lessing. He took up the original subtribe *Pectideæ* of Lessing;⁷ but of his later subtribe *Pectideæ*⁸ he made the division *Eupectideæ* to embrace *Pectidopsis*, *Pectidium*, *Pectis*, and *Lorentea*. Of *Pectis ang*

¹ Less. Linnaea, v. 134.

⁵ Atl. Jour. (1832) 145.

² l. c. vi. 706-721.

⁶ Prodr. v. 98-103.

³ L. Syst. Nat. ed. 10, 1221.

⁷ Linnaea, v. 134.

⁴ Obs. 307.

⁸ Less. l. c. vi. 706.

tifolia, Torr. he made a new genus *Pectidopsis*.¹ *Pectidium*, Lessing, was kept up, as was also his *Pectis* and *Lorentea*. *Pectis fasciculata*, Poir., which would seem a very distinct species, was reduced by De Candolle to *P. prostrata*, Cav., and six new species were described, five of them from Mexico. The genus *Lorentea* De Candolle divided into two sections, *Cryptopetalum* (for *Cryptopetalon*, Cass.), "Pappus radii paleis plurimis acuminato-setiformibus pappo disci brevioribus constans," and *Stammarium*, Willd. in Herb., "Pappus radii nullus aut dimidiatus auriculæformis brevis"; and he described five new species, *L. Hænkeana*, and *L. auricularis* (probably only a form of *Pectis canescens*, HBK.) from Mexico, and three from South America.

Hooker and Arnott,² in 1841, described two Mexican species, *P. Jalis-cana* (printed *Taliscana*), "pappo radii et disci setis 3-6 aristatis basi dilatatis paleisque paucis brevissimis"; and *P. diffusa*, "pappi paleis setiformibus scabris inæqualibus in disco 10-20, in radio paullo paucioribus." And in the same year Torrey and Gray³ in their Flora followed De Candolle and kept up *Pectidopsis* as a genus.

In 1844 Bentham published two Mexican species, *P. multiseta*⁴ from Cape San Lucas, and *P. arenaria*,⁵ in part from Acapulco. Both of these species are well represented by recent collections from the type stations. In 1846 Gardner⁶ published six Brazilian *Lorentreas*, and the next year followed them with another. In 1847 J. D. Hooker⁷ described two species from the Galapagos.

In 1849 Dr. Gray⁸ concluded that, rather than to continue multiplying genera undistinguishable in habit and with "numerous variations and gradations" in pappus, it was necessary "to extend the character of *Pectis* and restore to it *Pectidopsis*, *Pectidium*, and perhaps *Lorentea* also." In the same work he proposed two additional subgenera, *Heteropectis* and *Pectothrix*. In the subgenus *Heteropectis*, "Pappus coroniformis et 1-4-aristatus, vel saltem fl. disci muticus; aristis serrulato-scabris," were placed *P. multiseta*, Benth., and *P. uniaristata*, DC.; and *P. fastigiata*, *P. filipes*, and *P. Coulteri* were described as new. In the subgenus *Pectothrix*, "Pappus e setis aristisve gracilibus basi vix dilatatis 6-20 (raro paucioribus) serrulato scabris vel barbellatis constans, conformis, aut fl. radii brevis auriculæformis," he placed *P. diffusa*,

¹ DC. Prodr. l. c. 98.

⁵ Benth. l. c. 110.

² Bot. Beech. 296.

⁶ Hook. Lond. Jour. Bot. v. 239-241.

³ Fl. ii. 62.

⁷ Trans. Linn. Soc. xx. 206.

⁴ Benth. Bot. Sulph. 20.

⁸ Pl. Fendl. 61, 62.

Hook. & Arn., and *P. tenella*, DC. (connecting this group with *Pectis* proper); and *P. papposa* was described as new.

In 1852 Dr. Gray¹ showed that *Pectis angustifolia*, Torr. intergraded with his own *P. fastigiata*, and that with such evidence at hand both De Candolle's genus *Pectidopsis* and the species *Pectis fastigiata* were untenable. As a provisional arrangement of species Dr. Gray² then proposed the following: —

Pappus coroniformis, vel in disco vel in radio, et saepius 1-4-aristatis:

Aristis sursum sebris v. nullis. (*P. angustifolia*, filipes,
uniaristata, et sp. nov. Am. Merid.)

PECTIDOPSIS.

Aristis corneis retrorsum hispidis. (*P. Coulteri*, multiseta.) HETEROPECTIS.

Pappus uniformis, ex aristis paucis corneis laevissimis.

PECTIDIUM.

Pappus uniserialis, e paleis vel aristis basi paleaceo-dilatatis
paucis.

EUPECTIS.

Pappus biserialis paleaceus, in radio nunc dimidiato-a[u]ri-
culæformis, nunc nullus.

LORENTEA.

Pappus setosus, 1-2-serialis, setis capillaris basi vix aut
ne vix dilatatis, in radio nunc dimidiato-auriculæformis.

PECTOTHRIX.

Following the suggestion that *Lorentea* might well be united with *Pectis*, Schultz Bipontinus³ transferred to *Pectis* the *Lorenteas* of De Candolle's *Prodromus* and of Hooker and Gardner, though his only new species, *P. Seemannii*, afterward proved to belong in another genus.⁴

In 1853 Dr. Gray⁵ made additional notes on some of the old species, and described *P. (Pectothrix) longipes* and the anomalous *P. imberbis*. And in 1858 Triana⁶ described his genus *Cheilodiscus*, "Pappus coroniformis quinquedentatus, dentibus acutis persistentibus," with only one species, *C. littoralis*, from New Granada. Apparently this belongs to the section *Pectidopsis*.

In 1861 Van Hall⁷ published *P. febrifuga* from Curaçao. From the excellent plate accompanying the description, this would seem to be nearly related to *P. capillaris*. And since then a number of South American and West Indian species have been published, but these need not concern us here.

In the *Genera Plantarum*, Bentham and Hooker⁸ suggested that further study was necessary to clear up Dr. Gray's sections *Eupectis*, *Pectothrix*, and *Lorentea*.

¹ Pl. Wright. i. 82.

⁵ Pl. Wright. ii. 69, 70.

² l. c. 83.

⁶ Ann. Sci. Nat. ser. 4, ix. 36.

³ Bot. Voy. Herald, 309.

⁷ Fl. Jard. Pays-Bas, iv. 33, pl.

⁴ Benth. & Hook. f. Gen. ii. 412.

⁸ Gen. ii. 412.

In 1881 Hemsley¹ credited to Mexico 24 species of *Pectis*, though some of them doubtless cannot stand. *P. Liebmannii*, Sch. Bip., one of the best marked species of § *Pectothrix*, was described as new; and since the publication of Hemsley nine additional Mexican species have been described.

In 1883² Dr. Gray discussed the genus *Pectis*, making many critical notes upon the species. He at that time modified his division of the genus, so that he recognized only three sections: —

1. EUPECTIS. *Pappus paucipaleaceus*, vel pauci-aristatus aristis setiformibus, nunc ex aristis et paleolis paucis vel definitis constans, plerumque uniserialis.

2. PECTOTHRIX. *Pappus* (saltem fl. disci) multisetosus, inæqualis, plerumque biserialis, setis interioribus validioribus quandoque aristiformibus inferne sensim latioribus nec vero paleaceis.

3. PECTIDIUM. *Pappus* bi-tricornis, nempe ex aristis paucissimis (1-4) validis corneis sæpius divergentibus.

This division was followed in the Synoptical Flora,³ where *P. Rusbyi*, Greene, from Arizona, was described as new.

Two species, *P. gibbosa* and *P. linearis*, have been published in a recent number of La Naturaleza⁴ from old descriptions written by La Llave in 1832. These descriptions, however, contain so little of a specific nature that it is impossible to tell from them alone what the plants may be.

The genus *Pectis* is, as Dr. Gray has remarked, a very natural one; in fact, it presents such intergradations that it is difficult to get a really satisfactory basis for division into sections. Habitual characters in such a group, with many short-lived annuals, are very unsatisfactory: in many cases plants ordinarily perennial with a suffruticose base may develop as annuals. The color of the rays, the number and length of the basal setæ of the leaves, and the distribution of glands, are all characters so inconstant as to be of only minor importance. The only character which seems sufficiently constant, at least for the larger divisions into subgenera, is in the pappus, and even that presents some obstructions to the making of clearly defined groups.

In attempting to group all the United States and Mexican species, it seems that the best results are attained by a compromise between Dr. Gray's recent treatment of the genus (Proc. Amer. Acad. xix. 43-48), and his earlier division of it in Plantæ Wrightianæ (i. 83). The subgenus *Heteropectis* is sufficiently unique, apparently, in its retrorsely barbed

¹ Biol. Centr.-Am. Bot. ii. 224-227.

³ Gray, Syn. Fl. i. pt. 1, 360.

² Proc. Am. Acad. xix. 43-48.

⁴ La Nat. vii. Append. 84.

awns and low diffuse habit to separate it from the erect entire-leaved species of § *Pectidium* with smooth awns. The subgenus *Eupectis*, too, as recently defined by Dr. Gray, seems to contain two well marked groups, and therefore essentially the distinctions made by him in *Plantæ Wrightianæ* have been adopted: § *Eupectis*, with definitely paleaceous pappus, and § *Pectidopsis*, with a few slender but rather rigid aristæ. The subgenus *Pectothrix* has been taken up as defined by Dr. Gray in the Proceedings of the American Academy, it being impossible to find any satisfactory character to distinguish the old and confused § *Lorentea*.

As suggested before, these groups are not constant in their characters. But with the exception of a few cases, they are fairly well marked. Some forms of § *Eupectis* (*P. Berlandieri* and *Sinaloensis*) may have the pales rarely deciduous from the bases of slender awns, thus assuming the characters of § *Pectidopsis*. Other species (*P. arenaria* and *bracteata*) have in addition to definite pales some slender setæ, in this making a close approach to members of § *Pectothrix* (*P. Hænkeana*, *longipes*, *canescens*, &c.) with a few stout elongated setæ. In § *Pectidopsis* and § *Pectothrix* the pappus in either the disk or ray, or in both, may be reduced, and in such cases species, ordinarily well marked, may be confused. For instance, there are rarely such specimens of *P. papposa* with subfastigiate heads hardly to be distinguished from similar forms of *P. angustifolia*. In some species, too, of § *Pectidopsis* (*P. filipes* and *capillaris* for example), the pappus, either in the disk or ray, consists of rather stout smooth awns suggesting those of § *Pectidium*. In § *Pectothrix* the bristles are normally more than 10, but in *P. elongata* and *diffusa* they may become reduced in number and more or less dilated below, as in species of § *Pectidopsis* (*P. Berlandieri*, &c.). Species of § *Heteropectis* generally show little tendency to run into the other subgenera, but the disk-pappus in two species, *P. multiseta* and *ambigua*, is reduced. And in the apparently well-marked § *Pectidium* the pappus of *P. imberbis* may sometimes have, in addition to the rigid awns, a few paleaceous awns not unlike forms in § *Eupectis*; or the pappus may be entirely obsolete, as in the other subgenera.

PECTIS, L. Rather low branching mostly aromatic or heavy-scented herbs with opposite connate generally glandular-dotted leaves mostly with a few basal setæ, rarely setiferous to the tip, or even naked: heads small or middle-sized, mostly radiate, sessile or on bracteate peduncles, solitary or subcorymbose: involucre cylindrical or campanulate, naked at the base, of a single series of equal free generally glandular-dotted carinate and often involute bracts, more or less conduplicate

about the akene: receptacle naked: ray-flowers fertile, the rays yellow, rarely purple or white; disk-flowers perfect, the corolla 5-lobed, more or less bilabiate: style hispidulous, the short branches obtuse and without appendages: pappus of a few or many pales or awns or bristles, or reduced to squamellæ or to an auriculiform crown, or rarely wanting: akenes linear, terete or somewhat angled, generally pubescent, becoming glabrate. — Syst. Nat. ed. 10, 1221, Amœn. Acad. v. 407 & Gen. ed. 6, no. 963; Poir. Dict. v. 119; HBK. Nov. Gen. & Spec. iv. 261; Cass. in Dict. Sci. Nat. xxxviii. 202; Less. Linnæa, vi. 708; DC. Prodr. v. 98; Gray, Pl. Fendl. 61, Pl. Wright. i. 82, & Proc. Am. Acad. xix. 43; Benth. & Hook. f. Gen. ii. 412; Hemsley, Biol. Centr.-Am. Bot. ii. 224; Baker in Mart. Fl. Bras. vi. pt. 3, 285; Engl. & Prantl, Nat. Pflanzf. iv. Ab. 5, 266. *Seala*, Adans. Fam. ii. 131. *Lorentea*, Lag. Gen. et Spec. Nov. 28; Less. Linnæa, v. 135; DC. Prodr. v. 101. *Stammarium*, Willd. in Less. l. c. in syn.; DC. Prodr. v. 102, as section. *Cryptopetalon*, Cass. Bull. Soc. Philom. jan. 1817 & Dict. Sci. Nat. xii. 123. *Chthonia*, Cass. Bull. Soc. Philom. (1817) 33 & Dict. Sci. Nat. ix. 173. *Pectidium*, Less. Linnæa, vi. 706; DC. Prodr. v. 98. *Helioreas*, Raf. Atl. Jour. (1832) 145. *Pectidopsis*, DC. Prodr. v. 98; Torr. & Gr. Fl. ii. 62. *Cryptopetalum*, DC. l. c. 101, in syn. *Cheilodiscus*, Triana, Ann. Sci. Nat. ser. 4, ix. 36.

§ 1. *EUPECTIS*, Gray. Pappus (at least of disk) of comparatively large pales with or without terminal awns, or in one section with the pales often splitting away from the bases of the awns: involucre of 4 to 10 bracts. — Pl. Wright. i. 83 & Proc. Amer. Acad. xix. 44, in part. *Seala*, Adans. Fam. ii. 131. *Lorentea*, Lag. Gen. et Sp. Nov. 28; Gray, Pl. Wright. i. 83, in part. *Chthonia*, Cassini, Bull. Soc. Philom. (1817) 33, & Dict. Sci. Nat. ix. 173. *Pectis*, Less. Linnæa, vi. 708, in part; DC. Prodr. v. 98, in part.

* Pales few (4 to 6 in disk, 2 or 3 in ray).

+ Pales all attenuate or prolonged into awns or subulate tips.

++ Erect or diffuse, involucre 4-6 (usually 5)-bracteate: awns of the pappus with permanent paleaceous bases.

P. ciliaris, L. Slender, erect and sparingly branched or diffuse, 1 to 4 dm. high, the somewhat tetragonal stems smooth or sparingly puberulent above: leaves linear or linear-oblanceolate, acutish, 3 cm. or less in length, with 2 lines of large glands beneath and rarely a few irregularly scattered smaller ones; margins entire or closely serrulate, becoming revolute, bearing from 3 to 6 pairs of remote setæ well below

the middle: heads solitary or in 2's or 3's, sessile or subsessile in the axils of the leaves or on short leafy branches: involucre 5 to 6 mm. high, 10-15-flowered; the 5 linear-oblong bracts acutish, strongly conduplicate, keeled toward the bases, ciliate, bearing a few large glands especially toward the tips: rays narrow, 2 or 3 mm. long: pales subequal, the longest 1½ or 2 mm. long, lance-attenuate with a serrulate tip or with a lanceolate or lance-ovate fimbriate base tapering gradually to a serrulate awn; in the disk-pappus 1 or 2 shorter intermediate pales often present: akenes sparingly appressed-pubescent, 3 mm. long. — Syst. Nat. ed. 10, 1221, Amoen. Acad. v. 407, & Spec. ed. 2, 1250. *P. anceps*, Less. Linnæa, vi. 715, and *P. costata*, Ser. & Merc. in DC. Prodr. v. 100 *fide* Grisebach. *P. ciliata*, Steud. Nom. ed. 2, i. 360, in syn. *fide* Hook. f. & Jack. Ind. Kew. ii. 443. *Chthonia glaucescens*, Cass. in Dict. Sci. Nat. ix. 173, and *C. ciliaris*, Cass. l. c. xxvii. 206 *fide* Steud. l. c. (reduced to *Pectis ciliata*, doubtless a misprint for *P. ciliaris*) and *fide* Hook. f. & Jack. l. c. i. 532. — FLORIDA, Charlotte Harbor (Blodgett), Miami (Garber), Lastero Bay (Garber, no. 14), Tampa (Nash. no. 2479), Keys of Caximbas *fide* Chapman. Also in the West Indies.

P. Lessingii. More diffusely branched and more leafy than the last: leaves similar, but narrower, mucronulate, with 2 distinct rows of marginal glands: heads solitary on sparingly bracteate filiform peduncles 2 or 3 cm. long: bracts of involucre less conduplicate than in the last, the glands fewer or wanting: pappus more abruptly awned, or sometimes awnless: akenes spreading-pubescent or glabrate. — *P. linifolia*, Less. Linnæa, vi. 709 (excl. syn.), not L.; DC. l. c. 99 (excl. syn.); Griseb. Fl. Brit. W. I. 378; Gray, Syn. Fl. i. pt. 2, 360. — FLORIDA, Key West (Blodgett, Chapman), Palm Cape (Chapman), Miami (Garber), Cape Sable (Garber, no. 22, Simpson, no. 170), between Everglades and Biscayne Bay (Curtis, no. 1162). Also in the West Indies. A single anomalous specimen from Key West (Blodgett) has some of the leaves mucronulate and the solitary head subsessile, thus suggesting the preceding species.

++ ++ Depressed annuals: heads sessile or subsessile, with inconspicuous rays: pales subequal, lance- or linear-attenuate, sometimes awn-tipped.

— Pappus simply of attenuate pales, in the disk 5 or 6, in the ray 2 or 3.

P. prostrata, Cav. Stems prostrate, forming mats sometimes 4 dm. across (rarely simple and ascending), smooth or puberulent in lines: leaves oblanceolate or spatulate-linear, blunt or mucronate, 3½ cm. or less in length, 2 to 5 mm. broad, with many fine punctate dots on the pale

lower surfaces; margins entire or closely serrulate, slightly revolute, with 5 to 9 pairs of setæ mostly below the middle: heads solitary or in small terminal or axillary clusters: involucre oblong, 5 to 7 mm. high, 3 or 4 mm. broad, 9-25-flowered; bracts 5, oblong, blunt, with scarious margins and prominent thickened keels: pales sparingly serrulate, 2 to $2\frac{1}{2}$ mm. long: akenes spreading-hirsute or glabrate, $3\frac{1}{2}$ to 4 mm. long. — Ic. iv. 12. t. 324; Less. Linnæa, vi. 714; DC. Prodr. v. 100. *Chthonia prostrata*, Cass. Dict. Sci. Nat. ix. 173. — A common and polymorphous species, the typical form growing from the Southwestern United States to Yucatan and Guatemala. ARIZONA, near Camp Grant (Rothrock, no. 722), sandy plains near Mexican boundary (Pringle); NEW MEXICO (C. Wright, nos. 245, 1123); SONORA (Thurber, no. 971), Alamos (Palmer, 1890, no. 659); DURANGO (Palmer, 1896, no. 512); SAN LUIS POTOSI (Parry & Palmer, no. 361); OAXACA (Nelson, no. 1693); YUCATAN (Schott, no. 533, Gaumer, nos. 788, 1092); GUATEMALA, Santa Rosa (Heyde & Lux in John Donnell Smith's Exsic., no. 3366^b), Canchón (Heyde & Lux, no. 6154). A puzzling form with narrow heads and leaves setiferous to the tip has been collected in Guatemala (Heyde & Lux, no. 4232).

Var. *cylindrica*. Leaves generally rounded at the tips, rarely mucronate; setæ fewer, 2 to 5 pairs near the base: heads generally solitary (in one specimen clustered): involucre longer and narrower, 8 or 9 mm. high, 2 or 3 mm. broad; bracts 3, thin, plane or a little conduplicate, finely canaliculate, the mid-vein slightly or scarcely thickened into a keel: akene and pappus a third longer than in the type. — Southwestern United States and adjacent Mexico. ARIZONA (Palmer, 1867, no. 128), Apache Pass (Lemmon, no. 619); NEW MEXICO (Palmer); COAHUILA, Monclova (Palmer, 1880, no. 640); SONORA, Guaymas (Palmer, 1887, no. 145).

Var. *urceolata*. Ferruginous-pubescent on the stems, midribs, and involucres: leaves large, the larger $3\frac{1}{2}$ cm. long, 6 mm. wide, with 8 to 12 pairs of setæ: involucre urceolate, 9 or 10 mm. high; the 5 thick bracts with broad rounded pubescent keels. — CHIHUAHUA, Hacienda San José (Palmer, 1885, no. 53).

— = Pappus a row of linear-attenuate setulose pales, with a minute exterior setulose crown at the base; pales the same number both in the disk and in the ray.

P. *Schaffneri*, Schz. Bip. Very low and slender, 5 cm. or so high; stems puberulent: leaves linear-attenuate, cuspidate, $1\frac{1}{3}$ to $2\frac{1}{2}$ cm. long, 1 to $1\frac{2}{3}$ mm. wide, margins entire or minutely serrulate, becoming entire:

involucre oblong-lanceolate, 6 mm. high, 8-9-flowered, of 3 or 4 oblong acute nerveless conduplicate but scarcely keeled bracts: pales $3\frac{1}{2}$ or 4 mm. long, slightly exceeding the akenes. — Schz. Bip. in Gray, Proc. Am. Acad. xix. 45. — MEXICO, Valley of Mexico (Schaffner, no. 84).

++ ++ ++ Erect or diffuse: involucre 7-10-bracteate: pappus rufescent, the laciniate paleaceous bases often splitting away from the setulose awns.

P. Bonplandiana, HBK. Slender, erect or diffuse, dichotomously branched: the branches smooth or sparingly pubescent, 2 dm. or less in height: leaves linear-lanceolate, mucronate, entire or minutely serrulate toward the apex, 1 to $2\frac{1}{2}$ cm. long, 1 to 3 mm. wide, irregularly dotted beneath, with 1 or 3 pairs of basal setæ: heads terminal or axillary, solitary on slender 4-5 bracteate peduncles 2 or 3 cm. long: involucre 4 to $4\frac{1}{2}$ mm. high, about 20-flowered; bracts linear-ob lanceolate, acutish or blunt, conduplicate, minutely puberulent at the tips, keeled from above the middle and bearing a few large glands: rays narrow, 2 mm. long: awns of pappus subequal, the longest 2 mm. in length, in the disk 5 or 6, in the ray 2, the lanceolate pales slightly laciniate: akenes puberulent, 3 mm. long. — Nov. Gen. & Spec. iv. 263; Less. Linnæa, vi. 712; DC. Prodr. v. 99; Gray, Proc. Am. Acad. xix. 46. *P. linearis*, Willd. in Less. l. c. in syn. *P. Seemannii*, Gray, l. c. v. 181, not Schz. Bip. — Eastern Mexico. TAMAULIPAS, Tampico *fide* DC. l. c.; QUERETARO, near Queretaro (Humboldt & Bonpland in HBK. l. c.); VERA CRUZ, Wartenberg near Tantoyuca (Ervendberg, no. 137), Mirador (Liebmann, no. 395).

P. Sinaloensis. Diffuse, the branches smooth or hirtellous, $\frac{1}{2}$ to 4 dm. long: leaves oblanceolate or obovate-oblong, mucronate, entire, 2 cm. or less long, 2 to 8 mm. wide, sparingly dotted on the pale lower surfaces, naked or with 1 or 2 pairs of setæ: heads much as in the last but larger, on 4-7-bracteate peduncles 3 to 6 cm. (rarely $2\frac{1}{2}$ cm.) long: involucre 4 to $5\frac{1}{2}$ mm. high, 30-40-flowered; bracts more pubescent at the tips: rays 4 or 5 mm. long: pappus much as in the last, $3\frac{1}{2}$ to 4 mm. long, the pales more deeply laciniate: akenes sparingly appressed-pubescent or glabrate, hardly equalling the pappus. — On dry hills, Northwestern Mexico, December and January. SINALOA, Mazatlan (W. G. Wright, no. 1204, F. H. Lamb, no 313). A specimen collected by Seemann (without locality) belongs here, as probably does his no. 1490 from Mazatlan, cited by Hemsley under *P. Bonplandiana*.

← → Pales elliptic, mostly obtuse.

P. Swartziana, Less. Annual, erect, trichotomous above, slender, smooth, about 3 dm. high: leaves lanceolate or oblong-linear, obtuse or

acute, about 12 mm. long, 2 to 4 mm. wide, with 2 rows of large glands; margins scabrous, naked or with 1 or 2 pairs of basal setæ: heads about 5 or 6 mm. high, 10-12-flowered, on elongated peduncles: involucre cylindric, 5-8-bracteate, the conduplicate bracts obtuse and with scarious margins: pappus of short equal pales, or with one of them longer, lance-attenuate and serrulate. — *Linnæa*, vi. 711; DC. *Prodr.* v. 99 (Plum. *Pl. Amer.* ed. Burm. t. 86, f. 1). *P. patula*, L. f. in herb. *fide* DC. l. c. in syn. *P. punctata*, Swartz in herb. L'Her. *fide* DC. l. c. in syn. *P. ciliaris*, Swartz, Obs. 307, not L. — PANAMA, hills around Loseria (S. Hayes, no. 690 *fide* Hemsley); also in Jamaica and Hayti. Plant unknown to us, the description drawn from Lessing and De Candolle.

* * Pales many (10 to 20) at least in the disk.

← Stems more or less spreading or decumbent: leaves broadly linear.

P. arenaria, Benth. A prostrate perennial, the smooth, thick stems creeping extensively and forming mats, sending up many short branches with rosettes of leaves: leaves linear or spatulate-linear, 1 to 4 cm. long, 3 to 6 mm. wide, rounded at the tips and mucronate, pale beneath, obscurely but closely pellucid-punctate, with a single marginal row of dark glands; margins revolute, entire, with 3 to 7 pairs of basal setæ: peduncles erect or curving, 1 to 7 cm. long, compressed, angulate and almost winged above, with 2 to 7 prominent lance-subulate bracts 6 mm. long: involucre broadly cylindrical or campanulate, 8 to 12 mm. high, 5 to 8 mm. broad, 20-90-flowered; bracts 5 to 8, flat, imbricate, from lanceolate to ovate-oblong, 2 to 6 mm. wide, obtuse or acutish, many striate, slightly keeled below the middle and tapering to conspicuously thickened bases, sometimes sparingly ciliate: rays lanceolate to ovate-oblong, 6 or 7 mm. long: pappus sordid; in the disk of 10 to 20 linear-subulate very unequal setiferous pales, 4 to 6 of them longer (4 mm. long) and more dilated below than the others; in the ray shorter and usually fewer pales: akenes compressed, 6 or 7 mm. long, smooth and glossy or sparingly short-setose. — Bot. Voy. Sulph. 110. The synonymy of this species is very confused, and, from the descriptions, it is difficult to make it out. *Lorentea multiflosculosa*, DC. was described in the *Prodromus* (v. 102) from Peru, and from the description seems to be a form of *Pectis canescens*, HBK. The name, however, was soon changed by Schultz Bipontinus to *Pectis multiflosculosa* (Schz. Bip. in Seem. Bot. Voy. Herald, 309), but according to Bentham and Hooker f. (Gen. ii. 412) *P. multiflosculosa*, Schz. Bip. in herb. is the same as *P. arenaria*, Benth. Since then, however, Klatt (Leopoldina, xx. 92) has founded upon *P. multiflos-*

culosa, Schz. Bip., not *Lorentea multiflosculosa*, DC., a new species, *P. bibracteata*. With no authentic specimens at hand of the plants of either Schultz or Klatt the synonymy must still remain confused. The foregoing description of *P. arenaria* is drawn in part from material which has been kindly compared by Mr. Thiselton-Dyer with Bentham's type.— Prostrate in the sands of the Pacific coast of Mexico and Central America. SINALOA, Mazatlan (F. H. Lamb, no. 971); COLIMA, Manzanillo (Palmer, 1890, no. 971); GUERRERO, Acapulco (Barclay *fide* Benth., Palmer, 1891, no. 481); SAN SALVADOR, Conchagua (Œrsted *fide* Benth.). Also in Ecuador and Peru.

P. grandiflora, Klatt. Stem herbaceous, glabrous, branching; branches leafy even to the apex, monocephalous: leaves opposite, linear, mucronate, 2 cm. long, 2 mm. wide, densely glandular-punctate, with 6 pairs of setæ: peduncles terminal, 2½ cm. long, curving, angulate, almost winged, with 2 median bracts: involucre campanulate, 1 cm. long, equally broad, 40-flowered; the 5 bracts broad-ovate, 6 mm. wide, many-striate, keeled, densely ciliate: rays lanceolate, 5 mm. long, 1½ mm. wide, reddish: pales 14, scabrous, unequal, yellowish: akenes elongate, 6 mm. long, short-setose.— Klatt, Botanisch. Beibl. z. Leopoldina, 1895 (comp. nov. Costarie.), 6.— COSTA RICA, "Vers la huche du Hâto-Viejo, versant du Pacifique, leg. janv. 1893" (Pittier, no. 7342). A species unknown to us, the foregoing description, translated from Klatt, in many ways suggesting *P. arenaria*, Benth.

P. depressa. A depressed annual, forming mats sometimes 3 or 4 dm. across: stems villous, very branching: leaves linear-oblong, 1 to 2 cm. long, 1½ to 5 mm. wide, mucronate, ciliate, with 3 to 5 pairs of basal setæ, beneath densely punctate and with slightly villous midribs: heads solitary on terminal and axillary filiform 3–4-bracteate peduncles about 2 cm. long: involucre campanulate, 4 or 5 mm. high, 3 or 4 mm. broad, 35–40-flowered; the 5 unequal oblong obtuse bracts thin, ciliate and minutely punctate: rays oblong, yellow, 3 mm. long: disk-pappus of 10 or 12 linear-subulate unequal setulose pales and 3 or 4 longer ones, 2 mm. long; ray-pappus generally reduced to a short irregular crown of more or less confluent pales: akenes 2 mm. long, short-setose.— GUERRERO, very common in moist exposed places, Acapulco (Palmer, 1894, no. 16).

—+— Stems erect: leaves crowded, filiform.

P. bracteata, Watson. Perennial with a slender branching caudex: stems smooth, angulate, 2 or 3 dm. high, densely leafy toward the base, passing into many-bracteate long peduncles: leaves almost or quite fili-

form, 2 to 6 cm. long, with conspicuous subulate tips and 2 rows of dark glands, entire or rarely with 1 or 2 small lobes, but no setæ at the bases: peduncles elongate, $1\frac{1}{2}$ to 2 dm. long, with many bracts, the lower bracts leaf-like, the upper reduced: heads large, 1 cm. or so high, almost as broad, 60-80-flowered; involucre of 8 to 15 oblong bracts thickened and herbaceous below, with conspicuous dark glands, scariosus above, with round or subtruncate erose tips: rays oblong, 1 cm. long, white, becoming dark-striped with age: pappus sordid, of 10 to 20 subequal linear-subulate setiferous pales, a few of them setiform and hardly paleaceous below, $4\frac{1}{2}$ or 5 mm. long, equaling the glabrate akenes. — Proc. Am. Acad. xxv. 155. — COAHUILA, calcareous hills, Carneros Pass (Pringle, no. 2403). Originally placed by Dr. Watson in § *Pectothrix*, but the definitely paleaceous pappus, strongly resembling that of *P. Sinaloensis*, places it rather in this section.

§ 2. PECTIDOPSIS, Gray. Annuals, or rarely perennials(?) with narrow leaves setiferous at the bases: involucre short-cylindrical, the bracts linear, often becoming strongly involute: pappus of a few (1 to 6) slender upwardly scabrous setiform rather rigid awns sometimes dilated at the bases, with or without a short crown of separate or united squamellæ, or sometimes reduced merely to the crown. — Pl. Wright. i. 82. *Helioreas*, Raf. Atl. Jour. (1832) 145. *Pectidopsis*, DC. Prodr. v. 98. *Pectis* § *Eupectis*, Gray, Proc. Am. Acad. xix. 44, in part.

* Low branching herbs with elongate-linear leaves: heads subsessile or short-peduncled, fastigiate: involucre about 8-bracteate. (Forms of *P. papposa* may be looked for here.)

P. tenella, DC. Low, 2 dm. or less high, spreading and branching from near the base: stems angulate, smooth or minutely puberulous: leaves mucronate, $1\frac{1}{2}$ to 4 cm. long, 1 or 2 mm. wide, broadened at the bases, with prominent midribs and 2 rows of large glands on the lower sides; margins revolute, with 1 to 4 pairs of setæ at the bases: involucre 4 or 5 mm. high, 15-25-flowered; the bracts prominently keeled, with scariosus margins, bearing toward the tips a large gland, and sometimes 1 or 2 below: rays oblong, $3\frac{1}{2}$ to 5 mm. long, yellow: pappus merely of 2 to 6 slender variously unequal awns, the longest 2 to 4 mm. long: akenes slightly longer than the pappus, smooth or minutely short-setulose. — Prodr. v. 99; Gray in Torr. Bot. Mex. Bound. 73 & Proc. Amer. Acad. xix. 46. Plains, Southern Texas to Chihuahua and Tamaulipas. TEXAS, Laredo, and between the Rio Grande and the Nueces (Berlandier, nos. 599, 985, 2009, 2415), Rio Coletto (Thurber, no. 19); CHIHUAHUA, Chihuahua (Pringle, no. 648); TAMAULIPAS, near Mier (Gregg, no. 62).

P. angustifolia, Torr. Plant very aromatic, resembling *P. tenella*: pappus a shallow cup or crown of 4 or 5 more or less connate squamellæ. — Ann. Lyc. N. Y. ii. 214; Gray, Pl. Fendl. 61 & Gray in Torr. Bot. Mex. Bound. 73; Hook. Bot. Mag. ciii. t. 6286. *Helioereos*, Raf. l. c. *Pectidopsis angustifolia*, DC. Prodr. v. 98; Torr. & Gr. Fl. ii. 62. — Dry soil, KANSAS (Plank) and COLORADO (Parry, &c.) to LOWER CALIFORNIA (Palmer, 1887, no. 657) and CHIHUAHUA (Hartman, no. 817).

Var. *subaristata*, Gray. Pappus, in addition to the crown, of 2 slender awns. — Pl. Wright. i. 82. *P. fastigiata*, Gray, Pl. Fendl. 62. *P. angustifolia*, Gray, Proc. Am. Acad. xix. 46, in part, not Torr. — Southern Texas and New Mexico to San Luis Potosi. TEXAS, near Austin (Chas. Wright), between the Pecos and the Limpia (Chas. Wright, no. 244), Georgetown (Palmer, 1880, no. 703); NEW MEXICO, Deming (Kellogg); COAHUILA, Saltillo and Monclova (Palmer, 1880, nos. 701, 702); SAN LUIS POTOSI (Parry, no. 519), near Peotillos (Schaffner, no. 325).

* * Erect, branching above, heads short-pedunculate in cymose or glomerate inflorescences: involucre 3-5-bracteate: awns slightly dilated at bases. (Forms of *P. elongata* may be looked for here.)

P. fasciculiflora, DC. Stems erect from a slightly suffruticose base, smooth, 3 to 5 dm. high, branching mostly toward the summit: leaves linear-ob lanceolate, obtuse or acute, sometimes mucronate, the largest $3\frac{1}{2}$ cm. long, 6 mm. wide, faintly pellucid-punctate, entire, or closely serrulate, with 1 to 5 pairs of setæ toward the bases, or the lowest leaves rarely naked: heads crowded on short branches in the axils of the reduced floral leaves: involucre 4 to 6 mm. high, 8-12-flowered; bracts linear, acuminate, keeled below the middle: rays oblong, 3 mm. long: pappus 1 to 3 very slender awns 4 or 5 mm. long, with or without a shallow irregular squamellose cup at the base: akenes minutely setulose or glabrate, half as long as the pappus. — Prodr. v. 100. — Southwestern Mexico, first collected by Hænke. GUERRERO, San Marcos (Nelson, no. 2268). A little known species apparently well represented by Mr. Nelson's plant.

P. fasciculata, Poir. With the habit of the former: the leaves "ovales, lancéolées, élargies": the involucral bracts oblong, obtuse, and the pappus "une membrane qui supporte latéralement deux filets soyeux." — Dict. v. 120. — A plant, judging from the description, very near if not quite *P. fasciculiflora*, though placed by De Candolle in *P. prostrata*.

P. Berlandieri, DC. A low annual, 1 or 2 dm. high, of bushy habit, with many angulate smooth or minutely puberulent ascending

branches: leaves linear, the largest 3 cm. long, acuminate, sometimes mucronate, scabrous, with 2 to 4 pairs of setæ toward the bases: heads in an open leafy cyme, or glomerate: involucre 5 mm. high, about 12-flowered; the 5 linear acuminate bracts strongly conduplicate and slightly keeled toward the bases: rays narrow, 2 mm. long: pappus of subequal slender awns, 3½ to 5 mm. long; in the disk 5 or 6 (rarely 7), in the ray 2 or 3: akenes 2½ to 3½ mm. long, minutely short-setose or glabrate. — Prodr. v. 100; Gray, Proc. Am. Acad. xix. 46. — Eastern Mexico, near the coast. TAMAULIPAS, San Fernando (Berlandier, nos. 1537, 3037), near Tampico (Palmer, 1879, no. 1096); VERA CRUZ, between Tantoyuca and Tampico (Berlandier, no. 732), near Tantoyuca (Berlandier, no. 2152).

* * * Erect, simple or branching mostly above the base, stems purplish: leaves linear or lanceolate, the glands scattered or in lines between midrib and margins: heads scattered or solitary on long slender peduncles (2 or more times as long as the head): involucral bracts about 5, acute or acuminate, purplish: rays yellow or purplish. (Forms of *P. diffusa* may be looked for here.)

← Awns obviously dilated at the base.

P. capillaris, DC. Erect smooth or minutely pubescent annuals, 1 or 2 dm. high, with slender subtetragonal stems diffusely branching above: leaves linear, mucronate, the larger 3 cm. long, 3 mm. wide, above scabridulous, beneath with prominent midribs and two rows of large glands about midway between the margins and midribs; margins with 2 to 5 pairs of setæ below the middle: peduncles many, terminal and from the upper axils, capillary, 2 or 3 cm. long, 2-4-bracteate: involucres 4 to 6 mm. high, 10-15-flowered: rays oblong, 2 mm. long: pappus 2 to 6 (or even 1) slender awns 4 or 5 mm. long, with or without a few squamellæ at the bases: akenes hardly equalling the pappus, appressed short-setose or glabrate. — Prodr. v. 99. *P. Jaliscana* (printed *Taliscana*), Hook. & Arn. Bot. Beech. Voy. 296; Hemsley, Biol. Centr. — Am. Bot. ii. 225, in part; Gray, Proc. Am. Acad. xix. 46; Klatt, Leopoldina, xx. 91 (reprint 4). — Southwestern Mexico. JALISCO, Jalisco (Beechy *fide* Hook. & Arn.), Rio Blanco (Palmer, 1886, no. 760), Plains of Guadaluja (Pringle, no. 1813, in part); OAXACA, near Las Bacas, *fide* DC. l. c. There is little doubt that *P. Jaliscana*, described from incomplete material, is the same as De Candolle's plant. *P. Jaliscana* was based upon a form with squamellæ at the base of the awns, but in Palmer's Rio Blanco plants akenes with and without squamellæ are found on the same individual.

Var. paucicapitata. Slender, with a few elongated ascending branches: leaves variable in size, the largest 5 cm. long, 5 mm. wide,

with 4 or 6 rows of glands (only 2 rows on the small leaves) ; margins with 5 to 9 pairs of setæ : peduncles very few and scattered, capillary, 1 or 2 cm. long, 1-3-bracteate, involucre 5 mm. long, about 10-flowered : pappus of 2 or 3 setiform awns barely as long as the akene. — *P. Berlandieri*, DC. ? var. *Palmeri*, Gray, Proc. Am. Acad. xxi. 393. — CHIHUAHUA, south of Batopilas (Palmer, 1885, no. 61).

← + Awns slightly or not at all dilated at the base.

P. uniaristata, DC. Stems compressed-angulate, smooth or roughish below the nodes, very diffusely branched from below the middle, 1 to 3 dm. high : leaves mucronate, scabrous above, with 2 or 4 rows of glands beneath, bearing 3 to 5 pairs of setæ ; the caudine leaves about an inch long, the others becoming reduced to small bracts : peduncles slender, 8 to 13 mm. long, 1-3-bracteate : involucre 4 or 5 mm. high, about 10-flowered : pappus a shallow cupuliform crown and 1 or 2 (rarely 0) very slender setiform awns, 2 mm. long : akenes equaling the pappus, appressed short-setose. — Prodr. v. 99 ; Gray, Proc. Am. Acad. xix. 46. — Mexico *fide* DC. l. c. ; JALISCO, plains of Guadalajara (Pringle, no. 1813, in part) ; COLIMA, Manzanillo (Xantus). Both plants which have been examined have the stems distinctly angulate, not "terete" as in De Candolle's characterization ; but otherwise they conform closely to his description.

++ + Awns none, pappus merely a squamelloose cup.

P. dichotoma, Klatt. Erect or suberect, 8 to 15 mm. high, glabrous, somewhat dichotomous-branching : leaves spatulate-linear, submucronate, the largest about 2 cm. long, 2 mm. wide, with 2 or 4 rows of glands beneath, and bearing 2 to 4 pairs of setæ : peduncles capillary, 1½ cm. long, naked or with 1 or 2 bracts : involucre 3 or 4 mm. high, 8-10-flowered : cupuliform pappus slightly longer than in *P. uniaristata* : akenes short-setose or glabrate. — Leopoldina, xx. 92 (reprint 5). *P. filipes*, Sch. Bip. in herb., not Harv. & Gray. *P. Jaliscana*, Hemsley, Biol. Centr.-Am. Bot. 225, in part, not Hook. & Arn. *P. uniaristata*, DC., var. *holostemma*, Gray, Proc. Am. Acad. xix. 46. — Mexico, at Consoquitlo (Liebmann, no. 394).

* * * * Branching mostly from the base, often very diffuse : leaves linear with large scattered marginal glands : heads scattered or more or less clustered, on elongated capillary peduncles : involucral bracts 5 to 8, obtuse or acutish.

← Involucre 5-bracteate : awns obviously dilated at the base.

P. filipes, Harv. & Gray. Very slender (or the stem rarely becoming stout), 1 to 5 dm. high ; the diffuse branches smooth and shining or

scabrous, the internodes elongated: leaves plane or revolute, smooth or scabrous toward the bases, obtuse or acute and sometimes mucronulate, shorter than or equaling the internodes, in large specimens 5 or 6 cm. long, 3 mm. wide, naked or bearing 1 to 5 pairs of basal setæ: peduncles terete, 2 to 8 cm. long, ebracteate or with 1 to 3 remote bracts: involucre 4 to 6 mm. high, about 10-flowered, the bracts blunt or quite obtuse, plane or slightly keeled below the middle, generally glandless or with faint glands: rays 5 or 6 mm. long: pappus 1 to 4 slender rigid awns $2\frac{1}{2}$ to 4 mm. long, and sometimes a few blunt squamellæ at the base: akenes 4 or 5 mm. long.—Harv. & Gray in Gray, Pl. Fendl. 62; Gray, Pl. Wright. ii. 69, in Torr. Mex. Bound. 73 & Bot. Cal. i. 400. *P. Jalicana*, Hemsley, Biol. Centr.-Am. Bot. ii. 225, in part, not Hook. & Arn. *P. punctata*, Wats. Proc. Am. Acad. xxiv. 58, not Jacq.—A lemon-scented species common in the mountains from Southwestern Texas through New Mexico, Arizona, and adjacent Mexico. TEXAS, Pena Colorado (Havard, no. 11); NEW MEXICO, Coppermine Creek (C. Wright, no. 1125), Coke Cañon (Thurber, no. 1167); ARIZONA, Sulphur Springs (Rothrock, no. 539), near Fort Huachuca (Lemmon, no. 2781), Santa Rita Mts. (Pringle); SONORA, Guaymas (Palmer, 1887, no. 656). Founded upon Coulter's no. 329 from "California."

Var. subnuda. Suberect, branching mostly above the base: peduncles $1\frac{1}{2}$ to 3 cm. long, ebracteate or with one or two apical bracts: involucre pale, purple-tinged, 5 mm. high, the bracts acutish or rarely obtuse: rays 3 or 4 mm. long: the 1 or 2 awns 2 mm. long, usually with dilated bases: akenes $3\frac{1}{2}$ or 4 mm. long.—Southeastern Arizona and adjacent Mexico. ARIZONA, Bisbee (F. E. Lloyd); SONORA, Cocuto (Hartman, no. 70); CHIHUAHUA, Janos (Schott).

← + Involucre about 8-bracteate.

++ Bracts broad-linear, flat at least above the middle, very obtuse.

= Pappus of both ray- and disk-akenes aristiform.

P. Pringlei. Low, 5 or 6 cm. high, divergently much-branched, with strongly angulate glabrous branches and peduncles: leaves revolute, slender, mucronate, equaling or longer than the internodes, 1 to 2 cm. long, barely 1 mm. wide, with 2 pairs of basal setæ: peduncles $1\frac{1}{2}$ to $2\frac{1}{2}$ cm. long, usually 1-2-bracteate: involucre 5 or 6 mm. high, about 25-flowered; the bracts plane above, strongly keeled below, bearing a large apical gland, and 1 or 2 smaller ones below: rays 5 mm. long: pappus 2 or 3 very slender awns 3 to 5 mm. long, slightly dilated below: akenes equaling or slightly exceeding the awns.—DURANGO, Jimulco (Pringle, no. 125).

— = Ray-pappus aristiform, disk-pappus squamellose.

P. Rusbyi, Greene. “Mint-scented,” low, hardly 1 dm. high, simple or divergently but sparingly branched, the angulate stems and peduncles glabrous: leaves flat or a little revolute, spatulate-linear, with blunt or rounded tips (or a few mucronulate), 2 to 3½ cm. long, 1 to 3 mm. wide, with 2 or 3 pairs of setæ: peduncles 3 to 6 cm. long, 2-5-bracteate: involucre 4 to 6 mm. high, 30-40-flowered; the flattish bracts slightly keeled below, each bearing a large apical gland: rays 6 mm. long: ray-pappus 2 or 3 very slender awns 2½ or 3 mm. long, scarcely dilated below; disk-pappus a crown of many setaceous-tipped squamellæ, free or united at the base: akenes 4 mm. long, sparingly setose or glabrate. — Greene in Gray, *Syn. Fl. i. pt. 2*, 361. — ARIZONA, Beaver Creek (Rusby, no. 317).

++ ++ Bracts narrow-linear, involute, acutish. (Forms of *P. papposa* may be looked for here.)

— Pappus aristiform.

P. Rosei. Very diffusely branching from the base; the purplish terete stems smooth: leaves strongly revolute, becoming subterete, mucronate, equalling or exceeding the internodes, 2 to 4 cm. long, ½ to 1 mm. wide, with 2 pairs of basal setæ: peduncles many, terete, 2 to 4 cm. long, 4-6-bracteate: involucre 3 or 4 mm. high, about 20-flowered, the acutish bracts strongly keeled and bearing conspicuous elongated black glands: rays narrow, 3 mm. long, becoming rosy-tinged: pappus 2 or 3 slender awns 2 mm. long, and often a minute squamellose cup: akenes barely 3 mm. long, spreading-hirsute. — *P. punctata*, Rose, Contrib. U. S. Nat. Herb. i. 105, not Jacq. — SONORA, common on stony ridges, Alamos (Palmer, September, 1890, no. 730).

§ 3. *PECTOTHRIX*, Gray. Pappus of many (10 or more) capillary bristles, at least in the disk-flowers (or in *P. papposa* rarely reduced to a mere crown), a few of them sometimes enlarged but hardly paleaceous. — Pl. Fendl. 62, Pl. Wright. i. 83 & Proc. Am. Acad. xix. 47. *Cryptopetalon*, Cass. Bull. Soc. Philom. janvier, 1817, & Dict. Sci. Nat. xii. 123. *Lorentea*, Less. Linnæa, v. 135, in part; DC. Prodr. v. 101, in part; Gray, Pl. Wright. i. 83, in part [as section].

* Erect or suberect plants with ascending or spreading branches and ascending rigid leaves.

← Annual, branching mostly above the middle.

P. elongata, HBK. Stems rather stiff, purplish, simple below, with ascending or spreading branches; stems subterete, smooth, the branches slightly tetragonal: leaves linear, submucronate, smooth or scabridu-

lous above, $1\frac{1}{2}$ to $4\frac{1}{2}$ cm. long, $1\frac{1}{2}$ to 3 mm. wide, with 4 or 6 irregular rows of conspicuous glands beneath, and 4 to 10 pairs of basal setæ: heads scattered or subcorymbose toward the tips of the upper branches; the slender peduncles $\frac{1}{2}$ to 2 cm. long, generally with 2 approximate submedian bracts and often a third one above: involucre 5-bracteate, 5 mm. high, 10-12-flowered; the purplish bracts linear, acuminate, glabrous: rays small, yellowish: pappus 10-25 (sometimes reduced even to 3 or 4) upwardly scabrous unequal rufescent bristles slightly or not at all dilated below, the longest about 4 mm. long: akenes compressed, 2 to $2\frac{1}{2}$ mm. long, setulose with rufescent hairs. — Nov. Gen. et Spec. iv. 262, t. 392; DC. Prodr. v. 99; Baker in Mart. Fl. Bras. vi. pt. 3, 288; Hieronymus in Engler, Bot. Jahrb. xix. 60. *P. stricta*, Willd. in Less. Linnæa, vi. 710, in syn. *Lorentea polycephala*, Gardn. in Hook. Lond. Journ. Bot. v. 240 *fide* Baker l. c. — A common South American species extending north to Guatemala. GUATEMALA, Chupadero, Depart. Santa Rosa (Heyde & Lux in Exsic. J. D. Smith, no. 3806); PANAMA (Seemann). Both these specimens have the pappus-bristles greatly reduced in number, but otherwise they seem identical with the true South American plant as figured with the original description. A specimen from Nicaragua (Chas. Wright) which Dr. Gray thought might be a form of *P. Berlandieri*, is too old for determination, but it may belong here.

Var. *Schottii*. Much more slender with very slender diffuse branches and small leaves: heads scattered and solitary in the axils, on capillary 3-4-bracteate peduncles 2 or 3 cm. long: involucre pale, 4 mm. high: pappus hardly equalling the akene. — YUCATAN, Maxcanu (Schott, 1865, no. 666). Type in Herbarium of Field Columbian Museum.

← → Perennial, stems suberect branching from near the base.

P. diffusa, Hook. & Arn. A decimeter or so high, with a few suberect branches rising from the slightly suffruticose base, these branches simple or with short densely leafy branchlets above; stems angulate or subterete, smooth or puberulent, densely clothed with ascending leaves: leaves linear, thick, submucronate, with prominent midribs, smooth or scabrous on both surfaces, the larger 3 or 4 cm. long, $2\frac{1}{2}$ or 3 mm. wide, with or without 2 or 4 irregular rows of dots beneath, and with 5 to 10 pairs of setæ below the middle (setæ reduced or sometimes wanting on the upper leaves): peduncles capillary, from the upper axils, 1 to 4 cm. long, with 2 to 6 scattered subulate-ovate bracts: involucre 4 to 6 mm. high, of 5 oblong acutish or obtuse bracts, 10-12-flowered: rays linear-oblong, yellow, 6 or 7 mm. long: pappus of 10 to 20 (rarely only 4 or 5)

very unequal setiform bristles, the longer a little or not at all dilated below, and often with an exterior series of minute setæ at the base: akenes short-setose or glabrate. — Bot. Beech. 296; Gray, Pl. Fendl. 62, excl. syn. & Proc. Am. Acad. xix. 47, in part; Hemsley, Biol. Centr.-Am. Bot. ii. 225, in part; Rose, Contrib. U. S. Nat. Herb. i. 338. *P. Taliscana*, Benth. Pl. Hartw. 121, not Hook. & Arn. *fide* Hemsl. l. c. — Southwestern Mexico. JALISCO (Beechy in Hook. & Arn. l. c.); Rio Blanco (Palmer, 1886, no. 4), dry rocky hills near Guadalajara (Pringle, no. 1814); COLIMA, common on river banks at Colima (Palmer, 1891, no. 1155). Gregg's no. 967 (no locality given) is doubtless the same thing. The pappus of this as well as the last species is very variable in the number of bristles, which are sometimes reduced to 3 or 4, thus forming a transition to § *Pectidopsis*. The Nicaragua and Panama specimens referred here by Hemsley are more likely *P. elongata*.

* * More diffusely branched from near the base: leaves less rigid and more spreading: heads small or middle-sized.

← Annuals, the pappus mostly barbellate-setose (in *P. papposa* sometimes reduced to a mere crown).

P. papposa, Harv. & Gray. Stems smooth, much-branched, the divergent branches 3 dm. or less in length: leaves fleshy, narrow-linear, 1 to 6 cm. long, 1 or 2 mm. wide, rarely with a few sharp lobes, bearing 2 rows of prominent marginal glands and 2 to 5 pairs of basal setæ: heads subfastigiate, or subcorymbose on slender 1-3-bracteate peduncles 2 or 3 cm. long, the bracts often glandular: involucre $4\frac{1}{2}$ to 7 mm. high, about 20-flowered; the 7 to 9 linear strongly involute obtusish bracts more or less punctate: rays yellow, 4 to 8 mm. long: disk-pappus 12 to 20 unequal generally barbellate-setose bristles, 4 mm. or less in length, or sometimes reduced to a mere auriculate crown; ray-pappus a squamelllose or auriculate crown, rarely with 1 or 2 slender awns, or even obsolete: akenes 3 or 4 mm. long, hispidulous or strigose with minute uncinate or capitate bristles. — Harv. & Gray in Gray, Pl. Fendl. 62; Gray, Pl. Wright. ii. 69, in Torr. Bot. Mex. Bound. 73 & Syn. Fl. i. pt. 2, 361; Hemsley, Biol. Centr.-Am. Bot. ii. 226. *P. tenella*, Rothr. in Wheeler, Rep. vi. 171, not DC. *P. Palmeri*, Wats. Proc. Am. Acad. xxiv. 58, as to Palmer's no. 655. — Sandy or gravelly soil, Southwestern United States to Sonora and Lower California. NEW MEXICO, Doña Ana (C. Wright, no. 1126), Camp Bowie (Rothrock, no. 446), Deming (G. M. Kellogg); ARIZONA (S. Hayes, no. 342), Fort Whipple (Coues & Palmer, no. 522^a), Yuma (Pringle, no. 322), Maricopa (Pringle, no. 123), Tucson (Toumey, no. 675); CALIFORNIA (Coulter, no. 331),

San Diego Co. (Palmer, 1875, no. 200), El Rio (Lemmon, no. 78); SONORA, Valley of the Cocospera (Schott), Guaymas (Palmer, 1887, no. 655); LOWER CALIFORNIA, San Gregorio (Brandegree). Said to be lemon-scented.

P. Palmeri, Watson. A little stouter than the last: leaves mostly broader and thinner, about 4 cm. long, 2 to 4 mm. wide, with 1 or 2 short basal setæ: peduncles thicker, longer, scattered, 3 to 8 cm. long, 3-8-bracteate: involucre 5 to 6 mm. high, 35-50-flowered; the bracts plane, keeled below the middle: disk-pappus as in the last or merely scabrous; ray-pappus of 2 or 3 slender aristæ 3 mm. long, somewhat dilated at bases: akenes 4 mm. long, strigose with clavellate, not uncinate or capitate, hairs. — Proc. Am. Acad. xxiv. 58; Rose, Contrib. U. S. Nat. Herb. i. 338. — On foothills and in rich soil along streams, Sonora and Lower California. SONORA, Guaymas (Palmer, 1887, nos. 652, 653), Agiabampo (Palmer, 1890, no. 765); LOWER CALIFORNIA, Purissima, 1889 (Brandegree), La Paz (Palmer, 1890, no. 115). The Lower Californian plants are smaller and with fewer-flowered heads than the original Sonora specimens, but otherwise they are the same.

← ← Perennials or rarely annuals, the pappus merely scabrous.

P. stenophylla, Gray. Very diffusely branching from a suffruticose base, the branches purplish, slender, glabrous, 2 or 3 dm. long: leaves narrowly linear, mucronate, 3 or 4 cm. long, 2 mm. wide, or generally strongly revolute and scarcely 1 mm. wide, bearing two rows of marginal glands and 2 or 3 pairs of long slender basal setæ: heads scattered toward the tips of the branches; the filiform 4-6-bracteate peduncles becoming 5 or 6 cm. long: involucre 5 mm. high, 15-18-flowered; the 8 narrowly oblong bluish bracts plane above, slightly keeled below the middle: rays yellow, narrow: disk-pappus of 20 to 40 unequal upwardly scabrous capillary bristles 2 mm. or less in length; ray-pappus 2 slender smooth or minutely scabridulous awns $1\frac{1}{2}$ mm. long, slightly dilated below: akenes $2\frac{1}{2}$ to 3 mm. long, sparingly pubescent with short clavellate hairs. — Proc. Am. Acad. xxi. 393. — Hillsides and dry soil, Northern Mexico. CHIHUAHUA, Batopilas (Palmer, 1885, no. 81); SONORA, Arroyo Hondo (Hartman, no. 216, in part), Badehuachi (F. E. Lloyd, no. 402). Said to be aromatic.

P. Hænkeana, Schz. Bip. Perennial from a suffruticose base, or annual, the stems puberulous or pubescent, ascending or somewhat depressed, the longest 2 dm. in length: leaves pale green, linear or spatulate-linear, mucronate, 1 to $2\frac{1}{2}$ cm. long, $1\frac{1}{2}$ to 4 mm. wide, smooth or

slightly pubescent on both surfaces, slightly revolute, entire, or rarely obscurely pinnatifid at the base of the 2 to 5 scattered setæ, faintly punctate-dotted in 2 or 4 lines: peduncles axillary or terminal, capillary, 1 to 3 cm. long, 2-5-bracteate: involucre 5 mm. high, 25-30-flowered, the 5 oblong obtuse plane bracts smooth, ciliate at the tips, faintly marked with elongate glandular dots: rays ovate-oblong, 4 mm. long: pappus clear-white, in the disk of 5 or 6 elongate scabrous setæ $3\frac{1}{2}$ to 5 mm. long, and many unequal shorter capillary ones; in the ray generally fewer: akenes 3 or 4 mm. long, setose or glabrate. — Sch. Bip. in Seem. Bot. Voy. Herald, 309; Gray, Proc. Am. Acad. xix. 47. *P. capillipes*, Hemsley, Biol. Centr.-Am. Bot. ii. 225. *Lorentea Hænkeana*, and varieties, DC. Prodr. v. 102. *L. capillipes*, Benth. in Ørsted, Vidensk. Meddel. 1852, 70. — Mexico (Hænke *fide* DC.); OAXACA, San Antonio (Pringle, no. 5760), Cuicatlan (Nelson, no. 1598, L. C. Smith, no. 422). NICARAGUA, Segovia (Ørsted *fide* Benth. l. c.). Without authentic specimens, it is impossible from the description alone to distinguish Bentham's plant from De Candolle's. In the Oaxaca material, which is apparently all the same species, the suffruticose character is found only in Mr. Pringle's plant.

* * * Perennials, the stems subsimple or sparingly branched, mostly decumbent or procumbent from woody or suffruticose bases, rarely ascending with subsimple branches above: heads many (30-90)-flowered.

P. longipes, Gray. The glabrous slender densely leafy stems forming tufts or depressed mats, including the long scape-like peduncles $1\frac{1}{2}$ or 2 dm. high: leaves thickish, linear, mucronate, 2 to 4 cm. long, $1\frac{1}{2}$ to 3 mm. wide, bearing conspicuous marginal glands and 2 or 3 pairs of basal setæ: peduncles 6 to 14 cm. long, naked or few-bracteate: involucre broadly campanulate, 6 or 8 mm. high, 50-90-flowered; the 12 or 15 plane linear acutish bracts each bearing a large apical gland and rarely one or two toward the base: rays bright yellow, narrowly oblong, 1 cm. or less in length; disk-pappus 20 to 40 very unequal subbiseriate capillary upwardly scabrous bristles, the longest 4 to 6 mm. long, the shorter outer ones generally more slender; ray-pappus 2 slender setulose awns 3 to 5 mm. long, and rarely a few reduced bristles at the base: akenes 4 or 5 mm. long, more or less pubescent with short recurved unequally bidentate hairs. — Pl. Wright. ii. 69, in Torr. Bot. Mex. Bound. 73, in part, & Syn. Fl. i. pt. 2, 361; Hemsley, Biol. Centr.-Am. Bot. ii. 226, in part; Rose, Contrib. U. S. Nat. Herb. i. 122. — Mesas and mountain sides, Southwestern Texas (Coulter, Contrib. U. S. Nat. Herb. ii. 238) to S. Arizona and adjacent Mexico. ARIZONA, between the San Pedro

and Santa Cruz (C. Wright, no. 1127), Apache Pass (Lemmon), Foot-hills of Santa Rita Mts. (Pringle), Fort Huachuca (Palmer, 1890, no. 425); SONORA, Santa Cruz and Babocomori (Thurber, no. 996), Sonoyta valley (Rothrock, no. 635); CHIHUAHUA, San Diego (Hartman, no. 609).

P. canescens, HBK. Stems glabrous or puberulous or more or less canescent-hirtellous, from a few centimeters to 3 dm. in length: leaves rather rigid, linear or linear-oblong, acute, mucronate, 1 to $2\frac{1}{2}$ cm. long, 1 to 4 mm. wide, minutely punctate, entire or pinnatifid-dentate, with 2 to 10 pairs of setæ: peduncles terminal, slender, 1 dm. or less in length, 4-10-bracteate: involucre 6 to 8 mm. high, about 40-flowered; the 5 to 9 lanceolate to spatulate-obovate smooth plane bracts blunt or rounded at the ciliate tips, usually glandless and prominently keeled toward the bases: rays lance-oblong, yellow, 6 or 8 mm. long: disk-pappus 20 to 30 unequal rufescent mostly capillary setæ, a few of the longest somewhat stouter, 6 or 8 mm. long; ray-pappus as in the disk or of fewer setæ (*latisquama*), or reduced to a few subulate squamellæ (*canescens*), or auriculiform (*auricularis*), or entirely wanting (*satureioides*): akenes 6 mm. long, spreading-hirsute. — Nov. Gen. & Spec. iv. 263, t. 393, Gray, Proc. Am. Acad. xix. 47. *P. longipes*, Hemsley, Biol. Centr.-Am. Bot. ii. 226 (as to Berlandier plant), not Gray. *P. multiflosculosa*, Hemsl. l. c. not Schz. Bip. *Inula Saturejoides*, Mill. Dict. ed. 8; *I. saturejoides*, Willd. Sp. Pl. iii. 2104; *I. Satureiae*, Spreng. Syst. iii. 520. *Aster Saturejæ*, Banks in Reliq. Houst. 8, t. 19. *Lorentea saturejoides*, Less. Linnæa, v. 135 & vi. 718; DC. Prodr. v. 102 (*satureioides*). *L. canescens*, Less. l. c. vi. 718; DC. l. c. *L. auricularis* & var. *Acapulcensis*, DC. l. c. *Stammarium hyssopifolium*, Willd. in Less. Linnæa, v. 135, in syn. *Lorentea multiflosculosa*, DC. (Prodr. v. 102) is probably referable here. It is not, according to Bentham and Hooker f., or Klatt, the *Pectis multiflosculosa*, Schz. Bip. (see note under *P. arenaria*); and from De Candolle's description and note it seems very near if not quite *P. canescens*. A drawing, kindly furnished by Mr. Thiselton-Dyer, of CErsted's Guanacaste plant (see Benth. in CErsted, Vidensk. Medd. 1852, 70) shows that plant to be a form of *P. canescens* (*latisquama*). — Dry ground, mostly in the mountains, Central Mexico to Costa Rica. SAN LUIS POTOSI, near Sta. Maria (Schaffner, no. 370), between San Luis Potosi and Tampico (Palmer, 1878-79, no. 1097); NUEVO LEON (Berlandier, no. 3159); VERA CRUZ, near Vera Cruz (Houston *fide* Banks, l. c.), Wartenberg, near Tantoyuca (Ervendberg, no. 63); PUEBLA, Tehuacan (Galeotti *fide* Hemsl.); MEXICO, Valley of Mexico (Schaffner, no. 85), near Santa Fé (Schiede

& Deppe *fide* Lessing); JALISCO, Tequila (Palmer, 1886, no. 418); OAXACA (Galeotti *fide* Hemsl.); GUERRERO, Chilpancingo (Humboldt & Bonpland *fide* HBK.), Acapulco (Hænke *fide* DC.); NICARAGUA (C. Wright); COSTA RICA, Guanacaste (Ersted).

Var. *villosior*, Coulter. Low with thick woody caudex: stems and leaves villous or even lanate; the involucral bracts puberulous or villous. — Bot. Gaz. xx. 52. — OAXACA, between Tatolapa and San Carlos (Nelson, no. 2550); GUATEMALA, Santa Rosa (Heyde & Lux in Exsic. J. D. Smith, nos. 3401, 3413).

P. Liebmannii, Schinz. Bip. Suffruticose at base, the elongated slender procumbent branches 2 or 3 dm. long, the whole plant including leaves and involucre canescent-tomentose or even lanate on the young parts: the thick obovate-oblong revolute leaves cuspidate-mucronate, about 2 cm. long, 1 cm. or less wide, punctate beneath, with many small black dots, and 2 to 4 (according to Klatt 6 or 8) long basal setæ: peduncles solitary, terminal or axillary, 6 mm. or less long, 2-3-bracteate: involucre 6 or 7 mm. high, about 30-flowered; the 6 or 8 linear-oblong rosy-tipped bracts plane or somewhat involute, scarious on the margins, canescent on the back, and slightly thickened below: rays yellow, ovate-lanceolate, 3 or 4 mm. long: disk-pappus 20 or 30 unequal sordid upwardly scabrous setæ, the longest 4 or 5 mm. long; ray-pappus wanting: akenes narrowly fusiform, 3 or 4 mm. long, minutely pubescent or glabrate. — Schinz. Bip. in Hemsley, Biol. Centr.-Am. Bot. ii. 226 & in Klatt, Leopoldina, xx. 92 (reprint 5). Southwestern Mexico. "Lag. Lapotengo" (Liebmann, no. 471 *fide* Klatt l. c.); JALISCO, San Augustin (Liebmann, no. 467).

* * * * Aquatic subsimple plant with naked leaves and subsessile heads.

P. aquatica, Watson. Stems smooth, elongated, simple, or sparingly branched; leaves few, mostly above, thick, linear, entire, blunt, 2 or 3 cm. long, rarely with a few faint marginal glands: heads solitary in the axils, becoming recurved with age: involucre about 1 cm. high, of 5 imbricated flat obtuse purple-tipped blunt bracts, about 12-flowered, the flowers mostly included: rays none: pappus of 10 or 12 unequal serrulate bristles, the longest 2 mm. long and somewhat thickened, all ascending or converging at the tips: akenes compressed-angulate, very slender, 8 mm. long, with a long-attenuate base, appressed-setose with rufescent hairs. — Proc. Am. Acad. xxiii. 279. CHIHUAHUA, pine plains, base of Sierra Madre (Pringle, no. 1296). A unique species, the stems floating in ponds.

§ 4. *HETEROPECTIS*, Gray. Low diffuse puberulent plants with setiferous leaves: rays bright yellow: pappus of corneous subulate divergent retrorsely barbed awns (or reduced in the disk to a mere crown of rigid squamellæ). — Pl. Wright. i. 83. *Pectis* § *Pectidium*, Gray, Proc. Am. Acad. xix. 48, in part.

* Leaves thick, serrulate, the teeth and the tip continued into long setæ.

P. multiseta, Benth. Annual, stouter than the related species, 3 dm. or less high: leaves with slightly revolute margins, lanceolate, 1 to $2\frac{1}{2}$ cm. long, the lower surfaces covered with scattered large glands and smaller punctate dots: peduncles becoming 3 cm. long: involucre 4½ mm. high, 20–25-flowered, of 5 obovate-cuneate punctate and ciliate bracts: rays 6 mm. long: awns unequal in length (2 mm. or less), in the ray-flowers 3, in the disk-flowers 1 or 2, or the pappus reduced to a mere crown of more or less connate squamellæ: akenes 3 or 4 mm. long, pubescent with long somewhat capitate hairs. — Bot. Sulph. 20. — LOWER CALIFORNIA, Cape St. Lucas (Hinds *fide* Bentham, l. c. Xantus).

* * Leaves thinner, setiferous only below the middle.

P. Coulteri, Harv. & Gray. Annual or perennial (?), slender, very diffuse and branched, 2 dm. or less in height: leaves narrowly linear, usually with revolute margins, 3 cm. or less in length, generally with 2 rows of glands on the lower surfaces; setæ restricted to the subpinnatifid basal half of the leaf: peduncles varying in length from 3 or 4 mm. to 3½ cm.; involucre cylindraceous, 12–20-flowered, 5 to 7½ mm. high, of 5 (or by exception 6) linear-oblong often glandular-dotted ciliate bracts: rays 5 to 7 mm. long: awns somewhat unequal in length, in the rays 3 to 6, in the disk 2 to 5 (generally 3 or 4), about 1½ mm. long: akenes slender, 4 or 5 mm. long, strigose-pubescent with capitate hairs. — Harv. & Gray in Gray, Pl. Fendl. 62; Watson, Proc. Am. Acad. xxiv. 58. — On sandy plains, Arizona to the Sonora coast, "California," i. e. probably on the Gila River¹ (Coulter, no. 380); ARIZONA (Palmer), Sonora Alta (Coulter, no. 441 *fide* Hemsley); SONORA, Guaymas (Palmer, 1887, nos. 143, 654, 1890, no. 759). Dr. Palmer's Sonora specimens are much more vigorous throughout than the earlier-collected specimens from the Arizona desert region, but, except in size, the plants seem to be the same.

P. ambigua. Annual, similar in habit to *P. Coulteri*, but smaller, 1 dm. or less in height: leaves thin, entire, linear or spatulate-linear, flat,

¹ Coville, Bot. Gaz. xx. 528.

barely 1 cm. long, with the glandular dots irregularly scattered over the lower surfaces, and with only 1 or 2 pairs of basal setæ: peduncles 2 to 7 mm. long: involucre oblong, 10–12-flowered, 3 or 4 mm. high, of 5 linear-oblong more strongly costate glandular-dotted bracts: rays 3 or 4 mm. long: pappus of the ray-akenes three awns, the longest 1 mm. long, of the disk-akenes a minute squamellose crown: akenes 3 mm. long, sparingly pubescent with capitate hairs. — *P. multiseta*, Vasey & Rose (misprinted *multisecta*), Contrib. U. S. Nat. Herb. i. 72, not Benth. — LOWER CALIFORNIA, San Gregorio (Brandegée, 1889), common on sandy mesas, La Paz (Palmer, 1890, no. 23).

§ 5. PECTIDIUM, Gray. Erect glabrous plants with the leaves entire, naked or sparingly setiferous at base: rays white or whitish becoming purple: pappus of rigid smooth awns with or without a few aristiform paleæ and squamellæ, or reduced to a crown of corneous squamellæ, or even obsolete. — Pl. Wright. i. 83, & Proc. Am. Acad. xix. 48, in part. *Pectis*, Cass. in Dict. Sci. Nat. xxxviii. 202. *Pectidium*, Less. Linnæa, vi. 706.

* Slender annuals with thin leaves sparingly setiferous at base (very rarely naked): rays 1 or 2 mm. long: pappus consisting only of 2 or 3 corneous smooth (rarely a little denticulate) subulate divergent awns. — *Pectis*, Cass. l. c. *Pectidium*, Less. l. c.

P. linifolia, L. Rather tall and slender, 3 to 9 dm. high, paniculately branched: leaves plane or slightly revolute, linear or linear-lanceolate, the largest 5 or 6 cm. long, 5 mm. wide, dark green above, glaucous beneath and covered with many small round glands, with larger elongated ones along the margin: peduncles becoming 2 or 3 cm. long, with 1 or 2 minute bracts above the middle: involucre glabrous or minutely puberulent, 5 or 6 mm. high, 6–9-flowered, of 4 or 5 narrow linear blunt bracts, marked longitudinally with black glands and soon becoming involute: awns 2 or $2\frac{1}{2}$ mm. long: akenes minutely puberulent or glabrate, 4 mm. long. — Syst. Nat. ed. 10, 1221 (Sloane, Hist. Jam. t. 149, f. 3) & Amœn. Acad. v. 407 (*Tugetes* ? 2, Browne, Jam. 319); Gaertn. Fruct. t. 171; Lam. Ill. t. 684; Cass. l. c. *P. punctata*, Jacq. Enum. Pl. Carib. 28 & Stirp. Amer. 216, t. 128; L. Spec. ed. 2, 1250; Swartz, Obs. 308; Cass. in Dict. Sci. Nat. l. c.; Gray, Syn. Fl. i. pt. ii. 362. *Pectidium punctatum*, Less. Linnaea, vi. 707; DC. Prodr. v. 98. — YUCATAN (Gaumer, no. 887); LOWER CALIFORNIA, Cape St. Lucas (Xantus, no. 45). Common in the West Indies and reported from Venezuela and Galapagos.

Var. *marginalis*. More slender than the type, ascending, not so tall (the tallest about 4 dm. high): leaves pale green with remote orange-

red oblong marginal glands (very rarely a few glands scattered on the lower side of the leaf): heads a little longer than in the type: awns 2 mm. long: akenes 6 or 7 mm. long. — *P. punctata*, Wats. Proc. Am. Acad. xxiv. 58, not Jacq. — In shaded ravines and on mountain bluffs, Southern Arizona to the Sonora coast. ARIZONA (Palmer, 1867, no. 129), Tuscan (Smart, no. 382), Santa Catalina (Lemmon, no. 3031), Malpais Mts. (Pringle); SONORA, Guaymas (Palmer, 1887, no. 224).

* * Rigid glaucous perennial with ligneous root: leaves entirely without setæ: rays 6 to 9 mm. long: pappus various, erect, not divergent, the aristiform pales, when present, generally minutely serrulate.

P. imberbis, Gray. Stems sulcate, 3 to 9 dm. high, paniculately branched, sparingly leafy and junciform: leaves thick, linear, with revolute margins, the longest 6 or 7 cm. long, channelled above, and with the midrib very prominent beneath; lower surfaces with two rows of scattered elongated dark glands: peduncles about 2 cm. long, with a few linear-subulate bracts, especially toward the tips: involucre cylindrical, 7 or 8 mm. high, 10-12-flowered, of 5 or 6 linear blunt soon involute bracts marked with linear dark glands: disk-corollas with five longitudinal purplish stripes along the tube and with a conspicuous dark gland at the tip of each lobe; rays with or without one or two small glandular dots: akenes puberulent, 5 or 6 mm. long. — Pl. Wright. ii. 70 & in Torr. Bot. Mex. Bound. 73; Rothrock in Wheeler Rep. vi. 172. — Southern Arizona and adjacent Mexico. ARIZONA, near Fort Huachuca (Lemmon, no. 2783); SONORA, Sonoyta Valley (Wright, no. 1899, Rothrock, no. 636). CHIHUAHUA, Janos (Schott). Said to have a strong terebinthine odor.

II.— SOME RARE AND UNDESCRIPTED PLANTS COLLECTED BY DR. EDWARD PALMER, AT ACAPULCO, MEXICO.

SCLERIA LITHOSPERMA, Willd., var. *FILIFORMIS*, Britton, Ann. N. Y. Acad. Sc. iii. 231. Forming tussocks among underbrush on hills above Acapulco, November, 1894 (no. 76). Common in South Florida and the West Indies, the type occurring in Southern Asia and Australia.

Ruprechtia fusca. A tree about 4½ m. high, the trunk 2 dm. in diameter: bark of the slender branches pale brown, puberulent or glabrate, somewhat sulcate and verrucose: ochræ cylindric, puberulent, 7 mm. long, soon deciduous: leaves obovate, 5 to 9 cm. long, 2½ to 4½ cm. broad, coriaceous, on thickish petioles 3 to 6 mm. long, below subcuneato,